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I, JULIE BILLINGSLEY, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. 2002953591 for a patent by OWEN KEITH HUTCHISON as filed on 31 December 2002.

I further certify that the above application is now proceeding in the name of INNOVATIVE MOTORCYCLE TECHNOLOGY PTY. LTD pursuant to the provisions of Section 113 of the Patents Act 1990.

WITNESS my hand this
Eleventh day of August 2003

J. Billingsley

JULIE BILLINGSLEY
TEAM LEADER EXAMINATION
SUPPORT AND SALES

Australia
Patents Act 1990

Provisional Specification
Provisional Patent

COMBINED CLUTCH and BRAKE LEVER WITH ACTIVE ANTI-STALL

The invention is described in the following statement:

Combined Clutch and Brake Lever with Active Anti-Stall

Description

This invention is intended to improve the controllability of a motorised vehicle fitted with a clutch and brake.
It is based on the fact that both the clutch and brake functions control (within the constraints of gear selection and throttle settings) the rotational speed of the driven wheels.

To assist in the understanding of the invention reference will now be made to the attached drawings. The example shown in the drawings and described in the following dialogue was designed for use on a motorcycle as a finger operated control, however by substituting the operator's lever (2) with a foot operated pedal this system is also suitable for use on other vehicles that use foot controls. This system could also be used to control both front and back brakes of a vehicle instead of the brake, clutch application described.
The operators lever (2) is able to move in two ways

1. intowards the handlebars (1) as with a conventional lever
2. tilt relative to the handlebars

Because the lever is able to move in two ways it enables the operator to operate two functions either independently or simultaneously.
Also a feature of this invention is the ability to overlap the two functions being operated by changing the settings on the adjusters.
Pulling the operators lever (2) towards the handlebar from point 'B' locks lever (2) against the clutch operating arm (3) via the adjuster (15), in this position the microswitch (37) is open circuit thus enabling the control unit to control the brake function lock in solenoid (35). This control unit via a transducer sensing engine R.P.M will energise the brake lock solenoid if the engine R.P.M is above a predetermined value. Note ! the brake master cylinder is able to move fore and aft inline with its operation via the pivoting arms (25) and (26) but this movement is limited by adjusters (20) and (21). Its position is held in the brake bias position by a spring (22). In this position the freeplay in the slack adjuster (18) is taken up. If the brake function lock in solenoid (35) is energised it pulls and holds the brake master cylinder arms in a straight line which locks the brake master cylinder in the brake bias position. Pulling the operators lever intowards the handlebars from position 'B' under these conditions will cause the brake to be operated before the clutch is fully disengaged. However if the R.P.M should fall below the predetermined value of the control unit (39) will de-energise the brake function lock in solenoid (35). This allows the brake master cylinder locking arms (27) and (28) to 'fold' allowing the brake master cylinder to move back. Thus allowing the clutch arm (3) to move intowards the handlebar thus disengaging the clutch and preventing the engine from stalling whilst still operating the brakes. Note! The brake function lock in solenoid will not move the brake master cylinder to the brake bias position but will only hold it in that position.
Pulling the opertor's lever (2) intowards the handlebars (1) from position 'A' causes the operators lever (2) to pivot at pivot (9) which operates the microswitch (37) which in turn activates the brake master cylinder locking solenoid (35). As the operator's lever pivots at pivot (9) it also pivots at pivot (11) and the brake operating pushrod also pivots at point (12). Because the pushrod is able to pivot it no longer operates the brakes but as the lever (2) progresses towards the handlebars the clutch is operated independently until the bearing (13) hits the stop (5). This stop gives the operator tactile indication of the commencement of the brake function. Also upon the bearing contacting stop (5) the overall leverage ratio to brake is reduced until the bearing runs down the 'ramp' on stop (5). This 'ramp' can be angled to return the leverage ratio back to normal. This stop/ramp has the effect of compressing the distance required to effectively operate the brake. It is able to achieve this because the initial travel of the piston in the brake master cylinder requires less force than the last portion of its travel. This feature also assists in the tactile indication of the commencement of the brake function. Also if desired the adjuster (16) can be set to initiate the brake function earlier in the travel of the operators lever thus creating an overlap of the brake and clutch functions. Likewise the position of the stop (5) can be adjusted to achieve an overlap of functions.

Notes:

1. although not shown in the drawings flexible lines to brake master cylinder would be used to facilitate movement of the brake master cylinder
2. also not clearly shown in the drawings is the fact that the clutch master cylinder is positively located in relation to the main bracket (8)
3. Figure 2A shows an optional foot operated pedal. Note; this operates the brake operating arm and operates in the same way as if the operators lever (2) is pulled towards the handlebars from point 'B'. Also note that although the foot pedal shown uses a cable it could be hydraulic or any other suitable means of operation.
4. the return spring (22) could be replaced by a solenoid or an actuator which could also be controlled by the control unit (39)
5. Figure 4 shows a simple drawing of a more sophisticated control system to position the master cylinder. Note, that although only one master cylinder actuator is shown two could be used with the second one moving the clutch master cylinder. This system is designed to give superior control over the rotational speed of the wheel(s) of the vehicle.
6. Figure 5 shows a hydraulic method of altering the activation point of a function. Instead of moving the master cylinder as shown in figures 1 and 2 with this design a hydraulic piston moves in order to achieve the desired change in activation point of the function concerned. With this system the master cylinders are rigidly mounted and the device shown in figure 5 inserted between the master cylinder and the slave cylinder. The solenoid is connected to the control unit as shown in figure 3. The operation of the lever will be the same as before except for some of the slack in the freeplay adjuster will have to be adjusted out.

Note; the piston (45) and piston seal (46) could be replaced with a diaphragm made from suitable materials that 'bottoms out' to provide a stop for its displacement.
Also note that the system shown in figure (5) can be used to eliminate the need for a return spring in the master cylinder helping to reduce the overall force required to operate the system. This is achieved by using the piston (45) displacement from the unlocked position to the locked position to return the master cylinder piston in the last part of it's travel back to an open port position.

It will be realised that the combined clutch and brake lever with active anti-stall according to this invention is not restricted to the use of hydraulic cylinders as shown in the example, but may use other suitable forms of operating the brake or clutch, for example pneumatic, electric or any other means by which the brake or clutch can be effectively activated. It will be further realised the leverage ratios and hydraulic cylinder sizes shown are for example only and an individual vehicle may require re-positioning of pivot points, changing of leverage ratios or cylinder sizes or the use of power assistance to increase efficiency.

31ST December 2002

Owen Hutchison

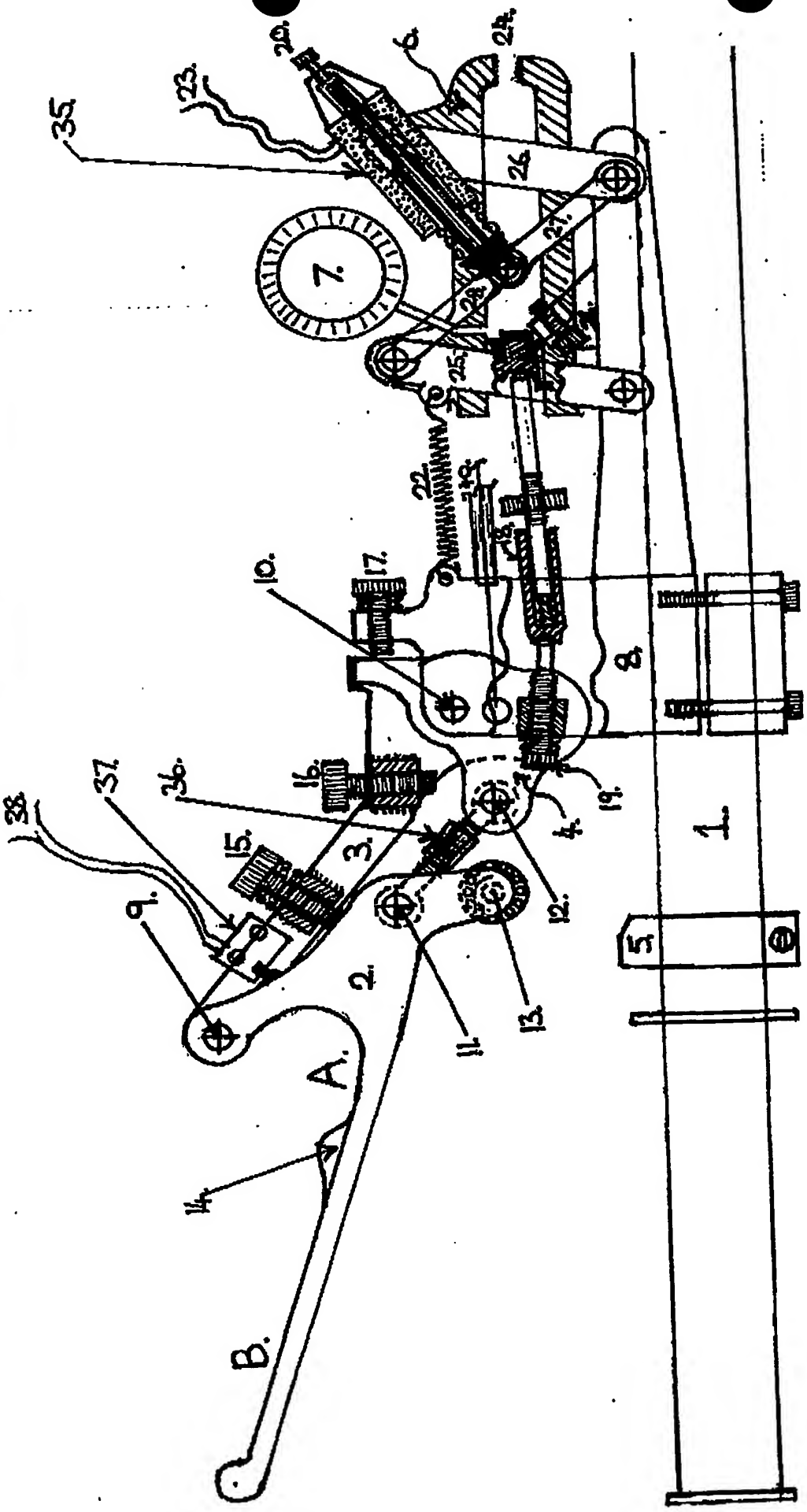
1. Handlebar
2. Operator's Lever
3. Clutch Operating Arm
4. Brake Operating Arm
5. Stop to facilitate tactile indication of commencement of brake function
6. Brake Hydraulic Master Cylinder
7. Fluid Reservoir
8. Main Bracket
9. Operator's Lever Pivot
10. Pivot for Brake and Clutch Arms
11. Pivot (1) for Brake Operating Push Rod
12. Pivot (2) for Brake Operating Push Rod
13. Bearing for tactile indication of brake function and to facilitate change of leverage ratio to brake
14. Raised portion of operator's lever to assist in tactile indication of position of fingers
15. Adjuster for changing relative angle between operator's lever and clutch operating arm
16. Adjuster for initiating brake function from clutch operating arm
17. Adjuster for setting 'at rest' position of brake operating arm
18. Slack Adjuster for brake function
19. Brake Adjuster
20. Adjuster for energised position of solenoid
21. Adjuster for unlocked position of brake lock arms
22. Spring to return brake master cylinder to brake bias position
23. Wires for power feed to brake function lock in solenoid
24. Hydraulic outlet from brake master cylinder (connects to brake slave cylinder)
25. Brake Master Cylinder Positioning Arm 1 of 4
26. Brake Master Cylinder Positioning Arm 2 of 4
27. Brake Master Cylinder Position Locking Arm 1 of 2
28. Brake Master Cylinder Position Locking Arm 2 of 2
29. Clutch adjuster
30. Adjuster for 'At Rest' Position of Clutch Operating Arm
31. Clutch Master Cylinder Operating Pin
32. Hydraulic Outlet from Clutch Master Cylinder
33. Clutch Master Cylinder
34. Brake Master Cylinder
35. Brake Master Cylinder Position Lock In Solenoid
36. Brake Operating Pushrod (adjustable)
37. Microswitch to Lock Brake Function
38. Wires for Microswitch
39. Control Unit
40. Foot Pedal Cable (optional)
41. Cable Adjuster (optional)
42. Footpeg
43. Foot Operated Pedal (optional)
44. Foot Pedal Pivot (optional)

45. Piston
46. Piston Seal
47. Bleed Screw
48. Piston Return Spring
49. Piston Locking Arm 1 of 2
50. Piston Locking Arm 2 of 2
51. Locking Solenoid
52. Over Centre Spring
53. Piston 'Locked Position' Adjuster
54. Piston 'Maximum Travel' Adjuster
55. Dust Seal
56. Position of Locking Arms Centre Pivot in the "Unlocked Position'
57. Hydraulic Line from Master Cylinder
58. Hydraulic Line to Slave Cylinder
59. Main Body
60. Centre Pivot for Locking Arms and Attachment Point for Rod End of Solenoid Plunger
61. Locking Arm (50) Pivot
62. Locking Arm (49) to Piston Pivot
63. Wires from Solenoid, connected to Control Unit as Shown in Figure 3.
64. Pivoting Mount for Locking Solenoid

Abstract

A system of levers and an engine speed operated locking device that enables the operator to operate both the clutch and brakes of a motorised vehicle with a single control that can be adjusted to prevent the stalling of the motor from brake lock.

FIGURE ONE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A.
14.
B.

FIGURE TWO

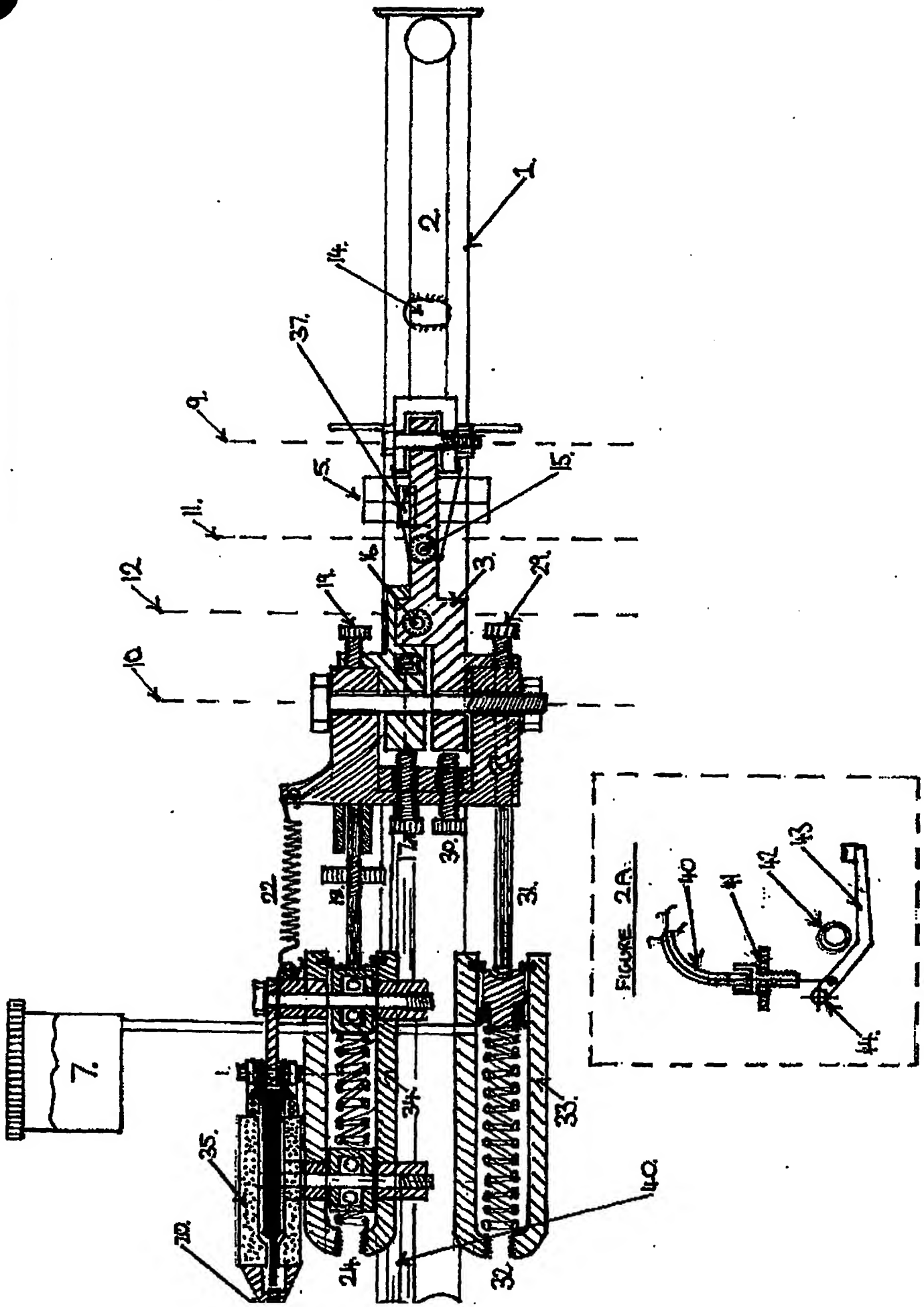

FIGURE 2A

FIGURE THREE

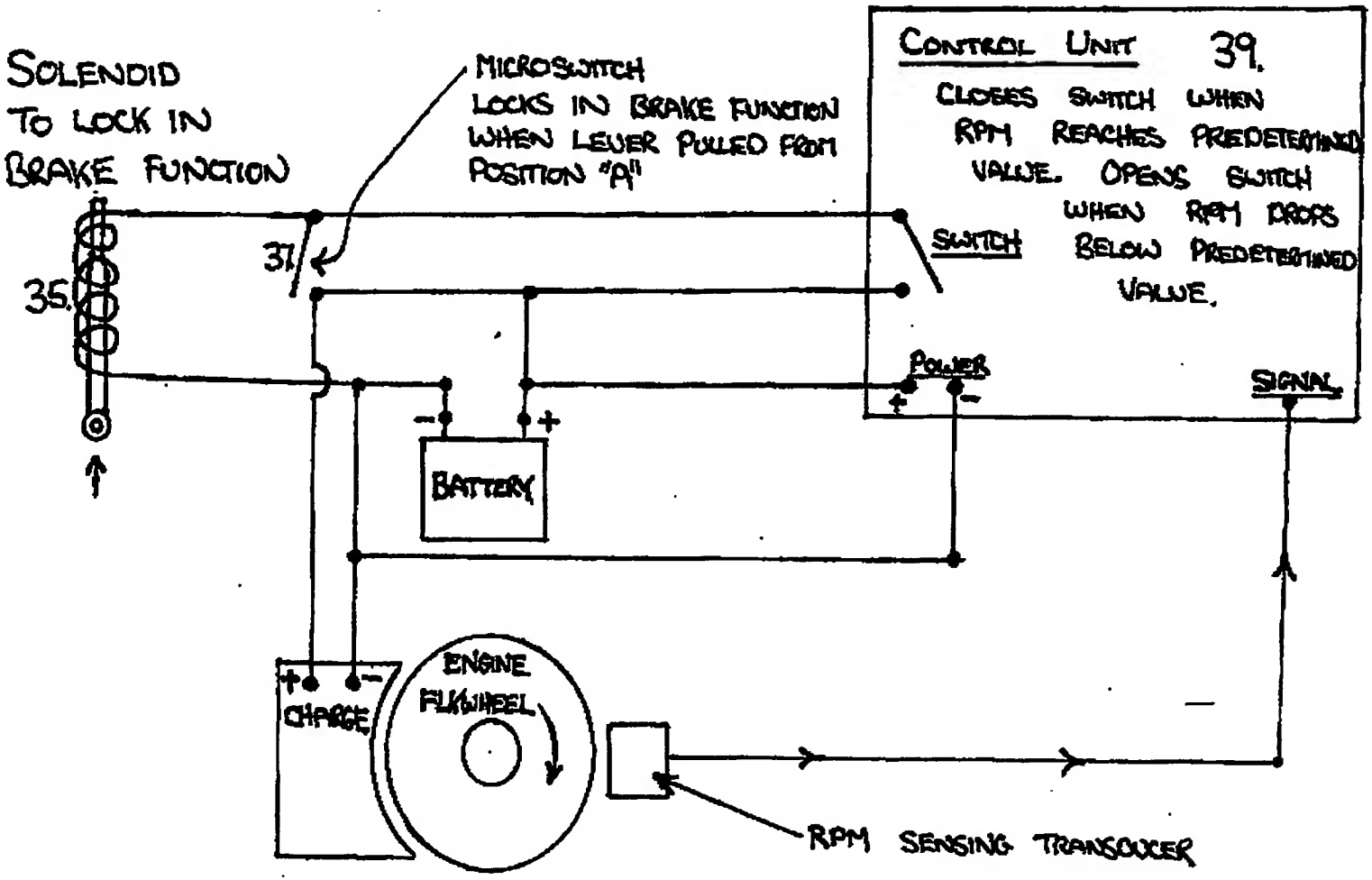

FIGURE FOUR

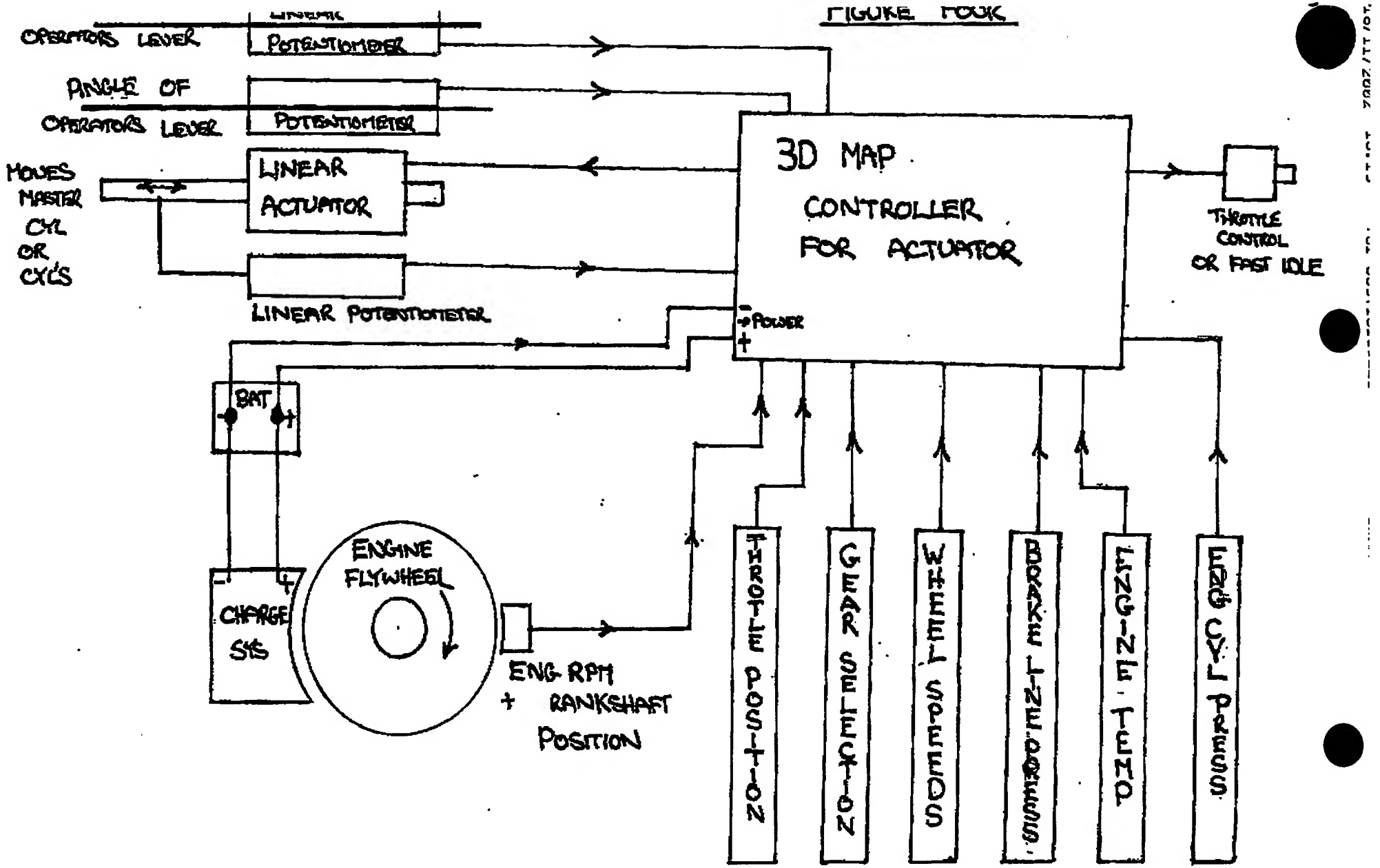
OPERATORS LEVER
POTENTIOMETER
ANGLE OF
OPERATORS LEVER
POTENTIOMETER
MOVES
MASTER
CYL
OR
CYLS
LINEAR
ACTUATOR
LINEAR POTENTIOMETER
3D MAP
CONTROLLER
FOR ACTUATOR
THROTTLE
CONTROL
OR FAST IDLE
POWER
BAT
CHARGE
SYS
ENGINE
FLYWHEEL
ENG RPM
+ RANKSHAFT
POSITION
THROTTLE POSITION
GEAR SELECTION
WHEEL SPEEDS
BOOST PRESSURE
ENGINE TEMP
ENG CYL PRESS

FIGURE FIVE